The effects of the physical environment on job performance: towards a theoretical model of workspace stress

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Summary

Studies of stress in the work environment pay little attention to features of the physical environment in which work is performed. Yet evidence is accumulating that the physical environment of work affects both job performance and job satisfaction. Contemporary research on stress in the work environment typically focuses on psychosocial factors that affect job performance, strain and employee health, and does not address the growing body of work on the environmental psychology of workspace. This paper reviews theory and research bearing on stress in the workplace and explores how current theory might be applied to the relationship between worker behaviour and physical features of the work environment. The paper proposes a theoretical model of the worker–workspace relationship in which stress and comfort play a critical part, and suggests a methodological approach on which to base future empirical studies. Copyright © 2007 John Wiley & Sons, Ltd.

Introduction

Studies of stress in the work environment tend to focus on psychosocial influences in the environ-

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ment where work is performed. This paper asserts that another important influence on work performance results from physical features of the work environment. Evidence is accumulating that the physical environment in which people work affects both job performance and job satisfaction (Brill, Margulis, & Konar, 1985; Clements-Croome, 2000; Davis, 1984; Dolden & Ward, 1986; Newsham, Veitch, Charles, Clinton, Marquardt, Bradley, Shaw, & Readon, 2004; Vischer, 1989, 1996). The tasks workers perform in modern office buildings are increasingly complex and depend on sophisticated technology;

and companies whose occupancy costs are increasing generally seek to reduce them without adversely affecting the workers. Such workspace decisions aspire to create an investment in employees' quality of life, the argument being made that measurable productivity increases will result. In addition, researchers are increasingly finding links between employee health and aspects of the physical environment at work such as indoor air quality, ergonomic furniture and lighting (Dilani, 2004; Milton, Glencross, & Walters, 2000; Veitch & Newsham, 2000).

Contemporary literature on stress in the work environment typically focuses on psychosocial factors that affect job performance, strain and employee health. Some theoretical models of stress at work have included the physical environment as a factor (Ivancevich & Matteson, 1980; Klitzman & Stellman, 1989; Lazarus & Folkman, 1984). But in many cases, studies referring to physical environment factors tend to refer to the physical parameters of the tasks being performed rather than to features of the physical space in which work is done. As research on job strain and other aspects of stress at work tends not to address the growing body of work on the environmental psychology of workspace, the purpose of this paper is to create a link between these two fields of endeavour.

In light of the growing importance of the environmental design of workspace in terms of financial investments as well as employee health and well-being, this paper reviews theory and research bearing on stress in the workplace. It then draws on research in environmental psychology to explore how current thinking might be applied to the relationship between worker behaviour and physical features of the work environment. The paper proposes a theoretical model of the worker–workspace relationship in which stress and comfort play a critical part, and outlines a methodological approach on which to base future empirical studies.

Overview of environmental stress research

The term 'environmental stress' often denotes adverse environmental effects in the natural world, such as damage to certain types of plant. The term 'work environment' is used in stress research to incorporate psychosocial dimensions such as employee–employer relations, motivation and advancement, job demands and social support. In this paper, therefore, the more specific term 'workspace stress' will be used to refer to the effects of the physical environment of work.

Established theories and current thinking in the field of stress at work provide some promising themes that can help define workspace stress. Cooper and Dewe (2004) in their description of how the concept of 'stress' has evolved, point out that it was originally an engineering term referring to the area or part of a structure affected by the load or demand placed on it by other parts. It has since broadened into a field of applied psychology. In this context, the term 'stress' applies both to the effects of fatigue on performance, namely in the context of man–machine systems, and to mental hygiene, or the diagnosis and treatment of mental problems at work (p. 11). Selye (1956) described the three stages of alarm, resistance and exhaustion as the human body deals with adverse environmental circumstances. These can equally well be applied to extreme physical environmental conditions. Mason (1972) identified likely causes of stress in a variety of job and other situations. His studies conclude that three main situational stressors are that the situation is novel, the situation is unpredictable, from the individual's point of view, and the individual has the feeling that he/she has no control over the situation. These stressors can be transposed to an analysis of the physical work environment, where it is not uncommon for workers to feel little or no control over, or understanding of, the workspace provided to them.

Studies of stress at work developed as techniques became available to measure levels of stress hormones such as adrenalin and noradrenalin (Theorell, 1986). From this and related research, decision latitude and psychological control emerged as two determining dimensions of job strain that could be applied to various job types. At a later stage, the third critical dimension of social support was added. Known as the 'demand-control' or 'job-strain' model, this model has dominated much of the research on work-related stress, the measurement of which has led to widespread use of the job strain scale (Karasek & Theorell, 1990). This framework can usefully be applied to analysis of the physical environment in which people work, both in terms of the environmental demands placed on users and the control, or lack of it, they have over their space (Vischer, 2005).

Other models currently guiding theory and empirical work on stress can also be considered

relevant to workspace stress. Cooper and Dewe (2004 p. 95) identify the 'interactional model' of stress, employing the traditional stimulus–response paradigm that has enabled researchers to generate data on multiple causes of stress at work. This is distinct from the 'transactional' model, in which stress is defined in terms of the interactive processes that relate an individual to his environment. Lazarus & Cohen (1977) introduced the concept of 'daily hassles' as a category of likely causes of stress that need to be distinguished from major life events because they are 'closer to the person's daily experience' (Kanner, Coyne, Schaefer, & Lazarus, 1981). In 'daily hassles', stress is generated by stable, repetitive or chronic conditions that 'annoy' on a regular basis. The concept of stress-causing hassles has proved useful to the study of the physical environment on people's behaviour (Lazarus & Cohen, 1977). Lazarus and his co-workers developed a 'hassles scale', which, after testing, seemed to confirm the importance of daily hassles in creating stress (Lazarus, 1984). His research emphasizes 'appraisal', or the effects of the perception of the subject, in mediating between environmental events and the experience of stress: for Lazarus, appraisal links person and environment, including physical environment.

Coping, the processes by which humans respond to stress, is related to appraisal in the transactional model (Lazarus, 1981). Studies of coping mechanisms have become part of the study of stress at work (Dewe & Guest, 1990; Latack, 1986; Schwartz & Stone, 1993). The distinction that Folkman and Lazarus (1985) draw between problem-focused and emotion-focused coping strategies might be applied to coping with environmental adversities, that is, workspace stress. 'Problem-focused' strategies are analogous to biomechanical responses such as coping with problems of glare from lights or seating that does not support backs, and 'emotion-focused' strategies are analogous to psychosocial responses such as inferring status from office size, opportunities for workspace personalization, and defining home territory. The assertion that a characteristic of coping behaviour is that it changes over the course of the event confirms that no single behaviour or psychosocial outcome can be identified as coping with adverse, uncomfortable or stressful workspace features. Rather, the presence of any behaviour form that can be construed as 'coping' with workspace suggests the presence of workspace stress.

Almost all theoretical models of stress at work refer to a mismatch or misfit between the demands of the situation and the resources of the individual. The focus on misfit, what it means, how it shows itself and how to measure it, is fundamental to work stress research and focuses on the transactional nature of the person–environment relationship and the processes that underlie it. The value of the 'cybernetic model' advanced by Cooper and Dewe (2004, p. 97) is its focus on person–environment interaction as a system, in which individuals constantly modify their environment while, at the same time, adjusting and adapting their behaviour to fit the environment they occupy. Prevailing theoretical models of stress at work emphasize the need for a good fit between a person's abilities, skills and degree of control—or decision latitude—and the work environment's demands, complexity, expectations and challenges. A poor fit in either direction (too many skills, not enough demands, or too many demands and insufficient control) generates stress (Czikszentmihalyi, 1990; Kaplan, 1983; Lawton, 1980). The relevance of the concept of 'fit' in environmental psychology is discussed below.

The environmental psychology of workspace

Researchers in environmental psychology have developed a rich literature on ways of measuring how the physical environment meets people's (users') needs, in which many varieties and examples of misfit are recorded. The definition of misfit is one in which the environment places inappropriate or excessive demands on users, in spite of their adaptation and adjustment behaviours (coping). The concept of environmental fit is well integrated into the environmental psychology literature (Alexander, 1970; Herring, Szigeti, & Vischer, 1977; Preiser, 1983; Zeisel, 2005).

So what are the elements in the physical workspace that can be identified as affecting fit or misfit between person and environment at work? One area of research that has begun to answer this question is ergonomics. Initially developed for military and manufacturing processes, ergonomics researchers now apply their assessment tools to office furniture and equipment to protect workers from long-term muscular or nerve injury due to poor bodily positioning or muscle use. Stress, from the ergonomics stand-

point, 'is frequently discussed in terms of the relationship between levels of performance and concepts such as arousal, signal detection theory and different environmental demands' (Cooper & Dewe, 2004, p. 65).

The ergonomic approach studies tools and equipment as well as workspace features as extensions of the human body. Those ergonomic features most frequently studied in workspace include lighting and daylighting, noise and noise control, and office furniture and spatial layouts in offices. These are summarized below.

Lighting research has tended to distinguish between the effects on building occupants of artificial, interior lighting and of natural light or daylighting from windows. Daylighting research has linked increased comfort and productivity with window size and proximity, as well as with view out, control over blinds and shielding from glare (Hedge, 2000; Leather, Pyrgas, Beale, & Lawrence, 1998; Mallory-Hill, van der Voost, & Van Dortmost, 2004). More significantly, research on daylight and views from hospital rooms has been shown to affect medication requirements and recovery rates (Ulrich, 1991; Verderber & Reuman, 1988). In their overview of the effects of different kinds of artificial lighting on task performance and occupant satisfaction, Boyce, Veitch, Newsham, Myer, and Hunter (2003) concluded that current office lighting standards are preferred by most people carrying out typical office tasks in a simulated office environment, where workers used controls to exercise their lighting choices. The study results made a distinction between visual comfort—lighting needed to perform well on office tasks—and satisfaction, or lighting judged to be aesthetic.

Current studies of noise in offices have adapted techniques for measuring noise levels in industrial environments. Workers in open plan workspace tend to judge noise to be a primary source of discomfort and reduced productivity (Hedge, 1986; Oldham, 1988; Stokols & Scharf, 1990; Sundstrom, Herbert, & Brown, 1982). Acoustic comfort studies have focused on correlating physical measures, such as signal-to-noise ratios at different densities, background noise levels and intensities, and speech intelligibility under differing physical conditions, with occupant judgements of distraction and annoyance (Ayr, Cirillo, & Martellota, 2001; Chu & Warnock, 2002; Mital, McGlothlin, & Faard, 1992). Efforts to control office noise through more absorbent surfaces, sound-masking systems and behavioural controls have been undermined by increasing office densities and collaborative work in modern workspace.

Perhaps the largest number of environmental psychology studies of workspace has focused on floor configuration and furniture layouts in the open plan office. Research indicates that these environmental factors have the greatest influence on worker satisfaction and performance (Brill, Margulis, & Konar, 1985; Hatch, 1987; Sullivan, 1990; Vischer, 1989). Studies have tended to focus on the height and density of workstation partitions, the amount and accessibility of file and work storage, and furniture dimensions such as work surfaces as being these elements of furniture and spatial layout which have the most effect not only on the satisfaction of individual workers but on the performance of teams. One study indicated that the additional investment in ergonomic tables and chairs for workers yielded a 5-month payback in terms of increased productivity (Miles, 2000). Several studies provide evidence that office workers are uncomfortable in open plan configurations and prefer private enclosed workspace (Brennan, Chugh, & Kline, 2002; Fried, Slowik, Ben-David, & Tiegs, 2001; Ornstein, 1999). In addition, aspects of psychological comfort such as territoriality and privacy are strongly affected by spatial layout: office size and location is linked with status; partitioning influences acoustic as well as visual privacy; amount of office storage is linked with territoriality and status (Fischer, Tarquinio, & Vischer, 2004; McCusker, 2002; Vischer, 2005; Vischer, McCuaig, Nadeau, Melillo, & Castonguay-Vien, 2003; Wells, 2000).

In their overview of stress related to the physical work environment, McCoy and Evans (2005) go beyond ergonomics to characterize as stressful those situations where elements of the physical environment interfere with the attainment of work objectives. Stressors in the work environment affect employee performance adversely when they are high intensity or prolonged; they slow down the individual's ability to process and understand the number and predictability of 'signals', which increase with task complexity. Potential stressors (i.e. elements that interfere with task performance, motivation and social relationships) include 'spatial organisation, architectonic details, ambient conditions and resources, and view or visual access from the workspace. As environmental stressors, [these] can influence physiological processes, produce

negative affect, limit motivation and performance, and impede social interaction' (p. 222).

Spatial organization issues include the openness of the layout: that is, the proportion of open workstations to private, enclosed offices, the height of partitions and the distance between open workstations, as well as access to needed resources, such as technology and equipment, meeting rooms and washrooms. Closely related to spatial organization are ambient conditions such as sound, visual openness and light, as well as ventilation and thermal comfort.

Architectonic details, which include colours and decoration, signage, artwork and design details, convey meaning and can have symbolic significance that affects people emotionally. For example, some work environments encourage personalization and individual decoration; some have key landmark elements that facilitate territorial definition for individuals or groups; some carry symbolic status, such as proximity to windows (positive) or to washrooms (negative). Architectonic details are likely to affect 'emotion-focused' coping behaviour in situations of workspace stress.

A mismatch between the demands placed on workers and the control they have over the physical environment in which they meet those demands is by definition stress-generating. McCoy and Evans (2005) emphasize the temporal dimension: an environmental element that is temporarily annoying cannot be identified as a stressor in the same way as that same annoying element's effect over time, when it becomes a daily hassle. The sustained impact of adverse environmental elements may also cause a delayed reaction, affecting performance after the stressor has been removed.

Environmental psychology research into the work environment has until recently focused on measuring user satisfaction—both job satisfaction and environmental satisfaction. Based on stimulus–response logic, this approach posits user satisfaction as a measurable behavioural response to features of the physical environment. However, little in this approach controls for the personal and experiential influences and prejudices that affect people's assessment of the quality of their workspace. The global and inexact concept of satisfaction does not address the complexities of the transactional nature of the person–environment relationship. More recent work on environmental comfort elaborates on the notion of fit between user and workspace, providing a sounder theoretical basis for workspace stress research.

Comfort and stress

The idea of human comfort has traditionally been applied in architectural history research to studying the functional aspects of the dwellings and buildings of older and remote cultures. Comfort as a basis for setting environmental standards in public buildings has developed out of recognizing that people need to be more than simply healthy and safe in the buildings they occupy. Once health and safety are assured, users need environmental support for the activities they are there to perform, that is, environmental comfort (Vischer, 1989). The concept of environmental comfort links the psychological aspects of workers' environmental likes and dislikes with concrete outcome measures such as improved task performance, as well as with organizational productivity through workspace support for work-related tasks.

Evidence suggests that environmental comfort comprises at least three hierarchically related categories: physical, functional and psychological (Vischer, 2005). Physical comfort includes basic human needs such as safety, hygiene and accessibility without which a building is uninhabitable. These needs are met through applying current building codes and standards to architectural design and construction decision making. Functional comfort is defined in terms of ergonomic support for users' performance of work-related tasks and activities. Appropriate lighting for screen-based work, ergonomic furniture for computer users, and enclosed rooms available for meetings and collaborative work, for example, help ensure functional comfort. Psychological comfort results from feelings of belonging, ownership and control over workspace. The environmental comfort model postulates that, although weakness in one category can be compensated for by strength in another, optimal environmental support for work performance is most likely to occur when workspace quality is assured at all three comfort levels.

Figure 1 illustrates the environmental comfort model. The diagram shows that while physical comfort is at the threshold of acceptable workspace, psychological comfort is affected by the degree of environmental choice or empowerment users feel they have through decision-making
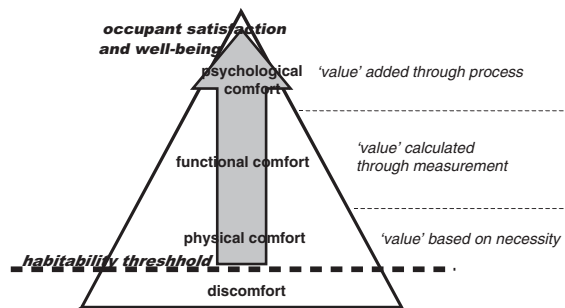
Figure 1. The 'Habitability' pyramid.
Note: From Vischer (2005).

processes. The third category, functional comfort, needs to be measured in order to determine which environmental elements support, or fail to support, work. Functionally uncomfortable workspace draws energy out of the worker that would otherwise be directed to performing work. Depending on the tasks they are performing, workers are more or less affected by environmental factors such as lighting, furniture layout and ergonomics, noise level and temperature. An adverse or problematic workspace ('poor fit') drains effort and energy out of the user: she cannot see well in poor lighting conditions, she has to get up and walk around to relieve back or neck pain, she has to wait to have a meeting because there is no space in her cubicle and no available conference room. On the other hand, a supportive, positive and effective work environment ('good fit') allows and even encourages occupants to apply all their energy and attention to performing work. The difference between a supportive and an unsupportive workspace is thus the degree to which occupants can conserve their attention and energy for their tasks, as opposed to expending it to cope with adverse environmental conditions. The 'energy' drawn out of users in adverse environmental conditions can therefore be hypothesized as coping mechanisms or behaviour; evidence that such mechanisms are present in employees' behavioural repertoire at work indicates a stressful (uncomfortable because unsupportive) workspace.

The environmental comfort model posits 'uncomfortable workspace'—where there is a misfit between what people need to perform their tasks and resources the physical environment provides—as a definition of workspace stress or strain. That is, sustained misfit situations generate stress, both of the 'daily hassle' variety as well as on a more critical level, such as in cases of sick building syndrome, where pollutants in the indoor air cause illness and absenteeism. Depending on the type of space and the work being performed, every office environment is situated somewhere along the stress-to-support continuum, with none being either all good or all bad, but most varying with type of user and type of tasks. Where the person–workspace interaction falls on the continuum also depends on time of day, time of year, availability and accessibility of office technology, and corporate values and culture.

According to the environmental comfort model, psychological comfort links psychosocial aspects with the environmental design and management of workspace through the concepts of territoriality, privacy and control (Sundstrom & Sundstrom, 1986; Vischer et al., 2003; Wells, 2000). A sense of territory is associated with feelings of belonging and ownership. Privacy is best understood as the need to exercise control over one's accessibility to others (Altman, 1975; Kupritz, 2000; Steele, 1986). Environmental control can be said to affect workers on at least two levels: mechanical or instrumental control, and empowerment (Vischer, 2005). Instrumental control exists where chairs and work surfaces can be raised and lowered, work tables on wheels can be moved around, lights are switchable, and there is an office door to open and close. Evidence indicates a positive psychological impact from this type of control in certain circumstances (Newsham, Veitch, Arsenault, & Duval, 2004; Tu & Loftness, 1998).

Empowerment as a form of environmental control increases opportunities for employees to participate and be heard in workspace decision making and means they are better informed. This alleviates the three stress-causing conditions identified by Mason (1972) by reducing novelty and unpredictability as well providing a sense of control through opportunities to have a say in design decisions. McCoy and Evans (2005, p. 237) characterize uncontrollability over workspace as a demotivator leading to 'learned helplessness'. Several studies demonstrate that psychosocial control by means of user participation in the design process has a positive effect on people's response to and feelings about their workspace (Dewulf & Van Meel, 2003; Veitch & Newsham, 2000; Vischer, 2004).

Towards a theory of workspace stress

Several of the concepts described in this paper can be applied to a framework for the study of workspace stress. First among these is 'goodness of fit'. The concept of fit can be expanded beyond the primarily architectural framework posited by Alexander (1966), which is somewhat static in its emphasis on environmental design, to a broader definition of fit between user abilities and motives over time, and degree of environmental complexity (Lawton, 1980). Broadening this definition and applying it to workspace takes us in several fruitful directions.

The environmental comfort model states that a workspace either supports the tasks and activities that are being performed there (comfort condition), or it fails to support them and in fact slows them down (uncomfortable condition and cause of stress). Studies of users' work behaviour, through observation and questioning, provide rich data on the degree to which workspaces are supportive (good fit) or unsupportive (bad fit, or mismatch). Applying this framework, the energy a user expends to overcome mismatched or unsupportive spatial elements is expressed as coping behaviour and can be measured as such.

Another potential direction for workspace stress research builds on the demand-control model of job stress. As Figure 2 shows, the two axes of decision latitude and psychological demands that are applied to different job types
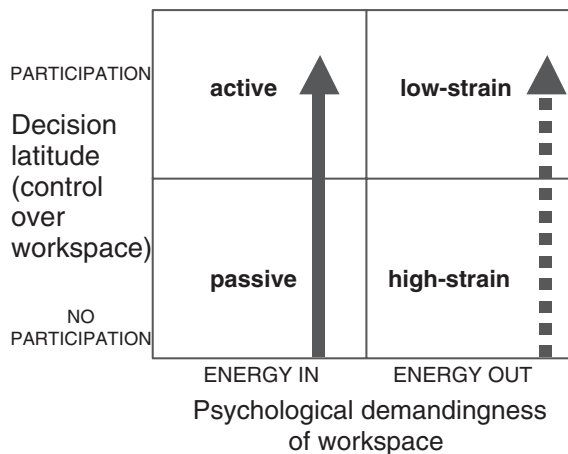

Figure 2. 'Demand-Control Model' of workspace stress.
Note: From Vischer (2005), after Karasek and Theorell (1990).

can be modified to apply to types of workspace such that workspace categories can be identified in terms of more or less strain on users.

This approach reduces the strict separation of behavioural measures from environmental features by fusing them into the more interactive notion of workspace as space accommodating specific tasks. Decision latitude translates into the degree of control users have over their workspace through participation in decisions; and psychological demands translate into the demandingness or energy required to perform tasks in a given workspace. Moreover, the demand-control model identifies social support as a third key factor influencing job stress and coping, and as indicated by McCoy and Evans (2005), physical elements and workspace design have an important role in determining social relationships and networks that develop at work. Stephenson (1998) has amply demonstrated the importance of informal social networks to facilitate the flow of information in organizations, and efforts have been made in some organizations to design workspace that facilitates informal social network formation.

In summary, the key building blocks for a theoretical model of workspace stress build on well-established themes in both stress research and environmental psychology. These include the notion of fit or match between user and environment, the concept of control and managing novelty and unpredictability, the measurement of daily hassles and energy-consuming impediments to the smooth performance of tasks, as well as the importance of social support, territoriality and environmental control.

Directions for future research

To validate and build on these theoretical links, workspace stress needs to be measured. Tools exist to measure functional comfort (Vischer, 1989), daily hassles (Folkman & Lazarus, 1985), coping and appraisal (Lazarus, 1981), as well as the multidimensional concept of control in relation to environmental novelty and predictability (Lupien et al., 2006). The concept of environmental comfort is derived in part from the notion of fit between user and environment and serves as a basis for the following hypotheses.

Every workspace can be defined as providing more or less support to people performing specific tasks and activities that have specific environmental requirements. The more support

people receive for the task, the more comfortable the space and the better fit between space and user. Spaces providing less support, that is, those that are inappropriate to some degree for the tasks being performed, are appraised as uncomfortable by users, requiring them to perform coping activities to solve environmental problems, and are therefore stressful. The degree to which coping with workspace occupies the time and attention of users represents, for employers, loss of time and attention from the performance of work.

Sense of control is an important mediating variable, in that perceived environmental control can reduce strain even when workspace discomfort results in coping behaviour. Furthermore, instrumental environmental controls effectively reduce stress by providing physical ways of solving environmental problems or discomfort, providing workers know how to activate them. Environmental empowerment, on the other hand, increases psychological comfort and reduces stress by increasing decision latitude. Without some degree of environmental empowerment (control), the novelty and unpredictability of workspace changes in today's modern corporate world are likely to increase discomfort and therefore stress.

Balancing environmental demands with the skills and abilities of users to act on their environment is a way of defining optimal workspace for creativity and flow (Czikszentmihalyi, 2003). The concepts of positive stress (Selye, 1979) and of environmental competence (Lawton, 1980; Sternberg, 2001) are both useful in this context, in that they recognize that some challenge is necessary to ensure active engagement. A workspace cannot be designed to be a one-time, final and permanent ergonomic support for all office tasks, but rather needs to be adaptable and 'negotiable' to be most supportive to users (Joiner & Ellis, 1985). Users need decision latitude as well as the skills and opportunities to engage with and adjust their environment successfully, over time and with changing task requirements, in order to optimize comfort and manage workspace stress successfully.

The environmental comfort model implies a multi-pronged approach to measurement and testing. Measures need to be developed to evaluate the demands or 'demandingness' of a given workspace (in terms of both task requirements and spatial features), to assess workers' decision latitude or experience of control, as well as to determine the amount of stress (discomfort) or of

support (comfort) judged to be present. The well-established functional comfort scale may be useful in establishing the demandingness of workspace, as users' judgements of functional comfort pertain to the combined assessment of the requirements of the tasks and the suitability of the spaces in which the tasks are being carried out (Vischer & Fischer, 2005).

The presence of workspace stress can be inferred from number and frequency of coping behaviours. The functions of coping are 'First, to change the situation for the better . . . , either by changing one's own offending action . . . or by changing the damaging or threatening environment; and second, to manage the subjective and somatic components of stress-related emotions themselves' (Lazarus, 1981, p. 197). Lazarus (1981) posits four coping modes, of which information search and direct action are likely to be relevant to workspace stress assessment. By defining workspace coping as behaviour (actions, thoughts, feelings) that solve a workspace problem, but that in doing so, claim workers' time and attention from their work, many of the behaviours that Lazarus and his colleagues have integrated into measurement scales can be used as a basis for measuring space-related coping. The more coping behaviour is recorded in a given space, the more workspace stress can be inferred.

Applying measurement results to the comfort model enables us to rate specific workspaces on a scale where comfort ('supportive') is at one end and lack of comfort ('stressful') is at the other, thus indicating the degree of worker effort and energy required. This could be developed into a tool to help organizations understand not only what kinds of changes to make to improve workspace, but also to see the return on investment from increased worker efficacy.

Thus, by combining elements of work stress research with the environmental psychology of workspace, it is evident that a new area of study is opening up, namely the study of stress attributable to the design of workspace. As we find out more about how, when and why the buildings where people work affect their health and morale, so we will be able to help companies make more humane and cost-effective decisions about workspace.

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